

Preliminary
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Location of plants of foreign companies in India

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Abstract

As compared to the econometric research on the inter-industry pattern of foreign direct investment (FDI) in India, there has been less research on the inter-regional pattern of FDI. This paper attempts an analysis of the location pattern of plants of foreign companies, thereby adding to the literature on the determinants of inter-regional pattern of FDI in India. The basic source of data for the study is the *Capitaline*. The data on location of plants of companies obtained from this source are used for the study, covering about 8000 plants, of which about 40% are plants of foreign companies (defined as companies in which 25% or higher proportion of equity is foreign owned). The analysis brings out that the state-wise pattern as well as the city-wise pattern of location of plants of foreign companies is very similar to that of the indigenous companies. The implication is that by and large the same set of factors influence the location decision of plants of local companies as that of foreign companies. Econometric analysis of plant location across 100 largest cities in 17 states brings out that city size is an important factor influencing location decisions of industrial plants. The presence of a metropolitan city in the state also has a favorable influence, which probably captures the advantage in 'headquartering' the country operations of MNCs. The location decisions of plants of foreign companies are found to be influenced by the investment climate and availability of educated workers in the state, and the availability of civic amenities in the cities.

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1. Introduction

As compared to the econometric research on the determinants of inter-industry pattern of FDI inflow into India (e.g., Kumar ____, Banga, 2003), there has been little econometric research on the factors influencing spatial distribution of foreign direct investment in India. One exception is a recent study by Aggarwal¹ which looks into the sensitivity of foreign direct investment to labor market conditions making a comparison across states. To model the labour markets in the context of FDI flows to different states, she uses a composite measure of labour market rigidities. She distinguishes between domestic market seeking and export oriented FDI and analyses their determinants separately. For her econometric analysis, she pools cross section data for 25 Indian states with time series data for 11 years (1991-2001). The theoretical underpinning is provided by integrating the OLI framework of FDI with the 'institutional theory'. Results of empirical analysis suggest that rigid labour markets discourage FDI. The effect of labour market rigidities and labour cost is found to be more pronounced for the export oriented FDI as compared with the domestic market seeking FDI. The econometric evidence presented in the study suggests that infrastructure and regional development induces higher FDI in the region/state, both for export-oriented and domestic market seeking FDI.

Another study pertinent to the issue under discussion is by Morris.² The focus of this study is on the determinants of FDI over the regions of India. Morris develops a framework drawn from the advantage concept of Kindleberger and from location theories rooted in regional science. He specifically uses Stephen Hymer's understanding of the parallels and relationship between the international organization of a global firm and the locational choices for the same with the spatial aspects of location of economic activities in general. This framework is applied to the situation in India in respect of large FDI flows since the reforms began in 1991-92 to arrive at a tentative explanation of the regional patterns of FDI. Morris argues that for all investments (other than those strictly confined to locations due to their requirements of either natural resources or the need to be very close to markets) it is the regions with metropolitan cities that have the advantage in 'headquartering' the country operations of MNCs (multinational corporations) in India, and therefore attract the bulk of FDI. Even more than the quantum of FDI, the number of cases of FDI, as also the employment effects, and spillover effects are large for such regions. Empirical support for this hypothesis is obtained from a study of the foreign investment intentions, and the distribution of investment projects.

¹ Aradhna Aggarwal, "The Influence of Labour Markets on FDI : Some Empirical Explorations in Export Oriented and Domestic Market Seeking FDI Across Indian States", Department of Business Economics University of Delhi, South Campus, undated.

² Sebastian Morris, "A Study of the Regional Determinants of Foreign Direct Investments in India, and the Case of Gujarat", Indian Institute of Management, Ahmedabad, 2004.

To provide the essence of the empirical evidence on which the above assertion is based, it would be useful to quote from Morris's paper:

“The distribution of *foreign financial cum technical collaborations* reveals that at about 1% or more (going either by the number of cases or the total equity involved), only Ahmedabad, Bangalore, Calcutta, Chennai, Coimbatore, Goa (considering the entire state as a ‘city’), Hyderabad, Jamnagar, Kancheepuram. Mumbai, Pune, Raigarh (Pune) were the significant cities. In the case of Jamnagar, one unit made all the difference. Kancheepuram itself has to access the central place functions of Chennai. Besides the metros the other cities are among the most dynamic and with the best city serving functions especially Bangalore, Hyderabad and Pune. Ahmedabad known to be mediocre in this respect barely makes it. The lead of Bangalore, Hyderabad, and of even much smaller Pune over Ahmedabad is very large. And Delhi and Mumbai especially the latter with a phenomenal 42% of all investment, are in a class by themselves. Thus clearly the primate and central place driver in the location of FDI as discussed earlier is clearly seen. FDI tends to concentrate in the largest and best cities. Another 17 cities housed FDI to the extent of 0.25% or more using either of the measures. Most other cities (including many that are not in the list) were almost entirely out of the picture. This is as is expected, given the higher need for central places on the part of FDI firms and their higher ability to pay for the rents.” [Italics mine; emphasis added] (Pages 31-32).

To explain the concept of ‘largest city’ used above, Morris notes: “Population is less of a factor than purchasing power and the services available in which respect Mumbai and Delhi would tower over Chennai and Calcutta. After Mumbai and Delhi, Bangalore would be next followed by Hyderabad and Calcutta. Kanpur and Lucknow are far smaller and less livable in this respect.”

2. Objective and Data Source of the Present Study

This paper builds on and complements the research of Aggarwal and Morris briefly discussed above. The paper attempts an analysis of the location pattern of plants of foreign companies in India, thereby adding to the literature on the determinants of inter-regional pattern of FDI in India.

The basic source of data for the study is the *Capitaline*. The data on location of plants of companies obtained from this source are used, covering about 8000 plants, of which about 40% are plants of foreign companies (defined as companies in which 25% or higher proportion of equity is foreign owned).

Aggarwal and Morris have based their analysis on data on approvals of financial and technical collaborations. The data source for this study is obviously quite different. In a sense, the data source used by Aggarwal and Morris reflect investment intentions, while the database used here reflects actual investments. It may be noted further that the present analysis is carried out at city level, which makes it similar to that of Morris.

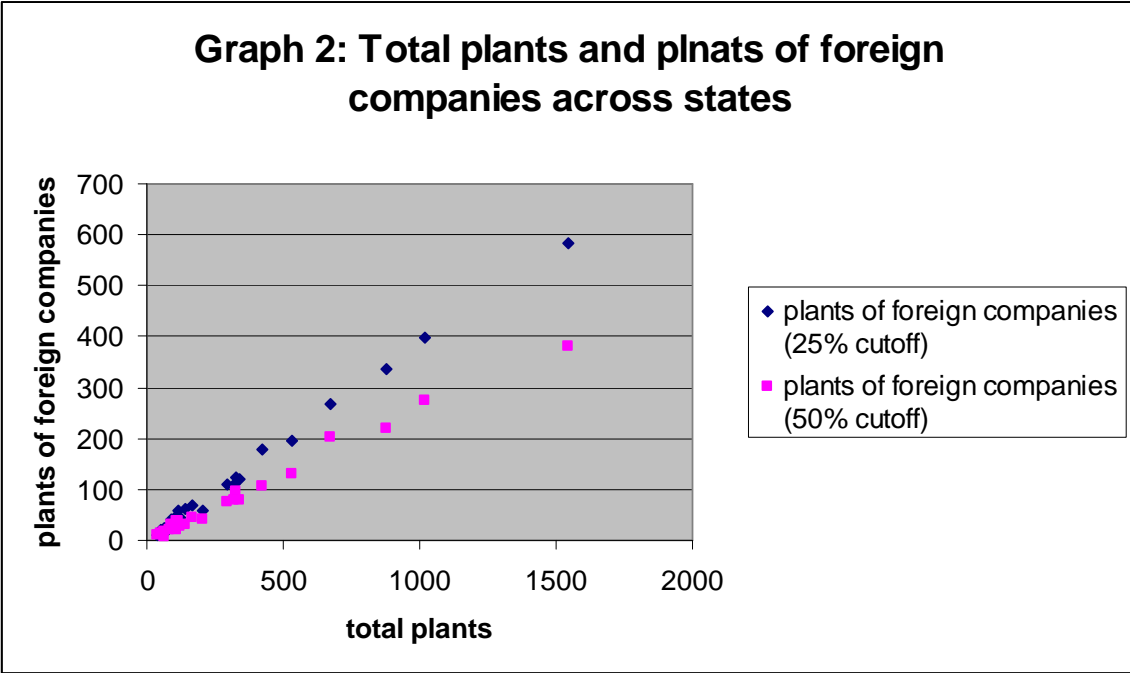
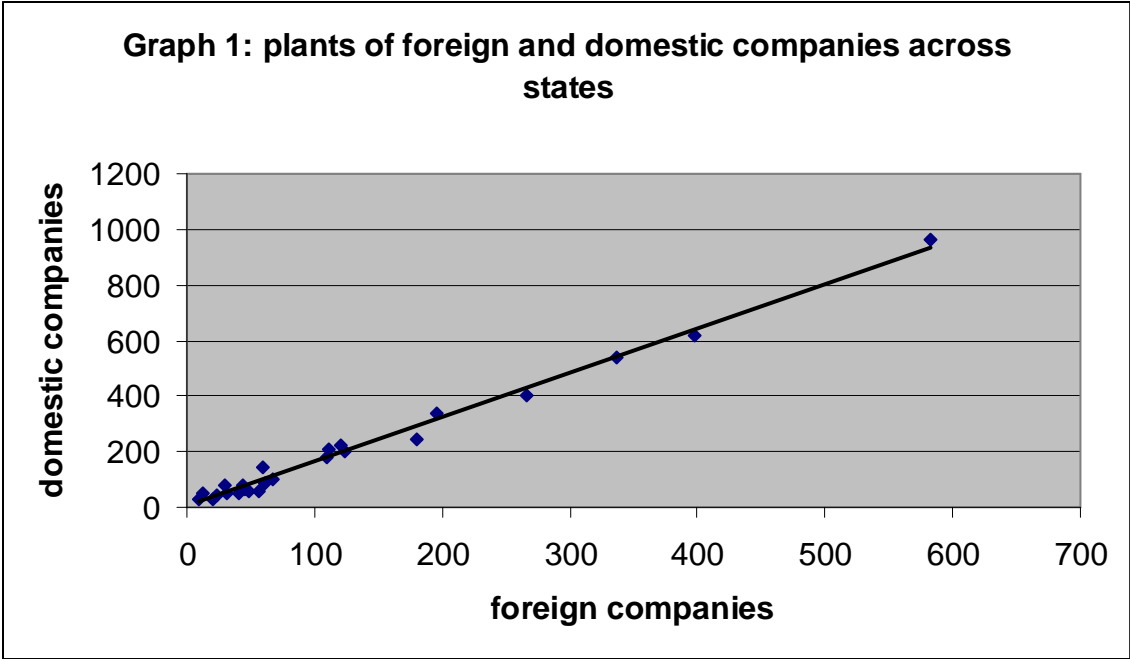
3. Preliminary analysis of the Data

Table 1 presents the distribution of plants of foreign and domestic companies. It is interesting to note that the relative share of states in plants of foreign companies is very close to the share in plants of domestic companies. The cross-state correlation in the number of plants of foreign and domestic companies is 0.99 (see Graph 1).

Table 1: State-wise distribution of plants of foreign and domestic companies

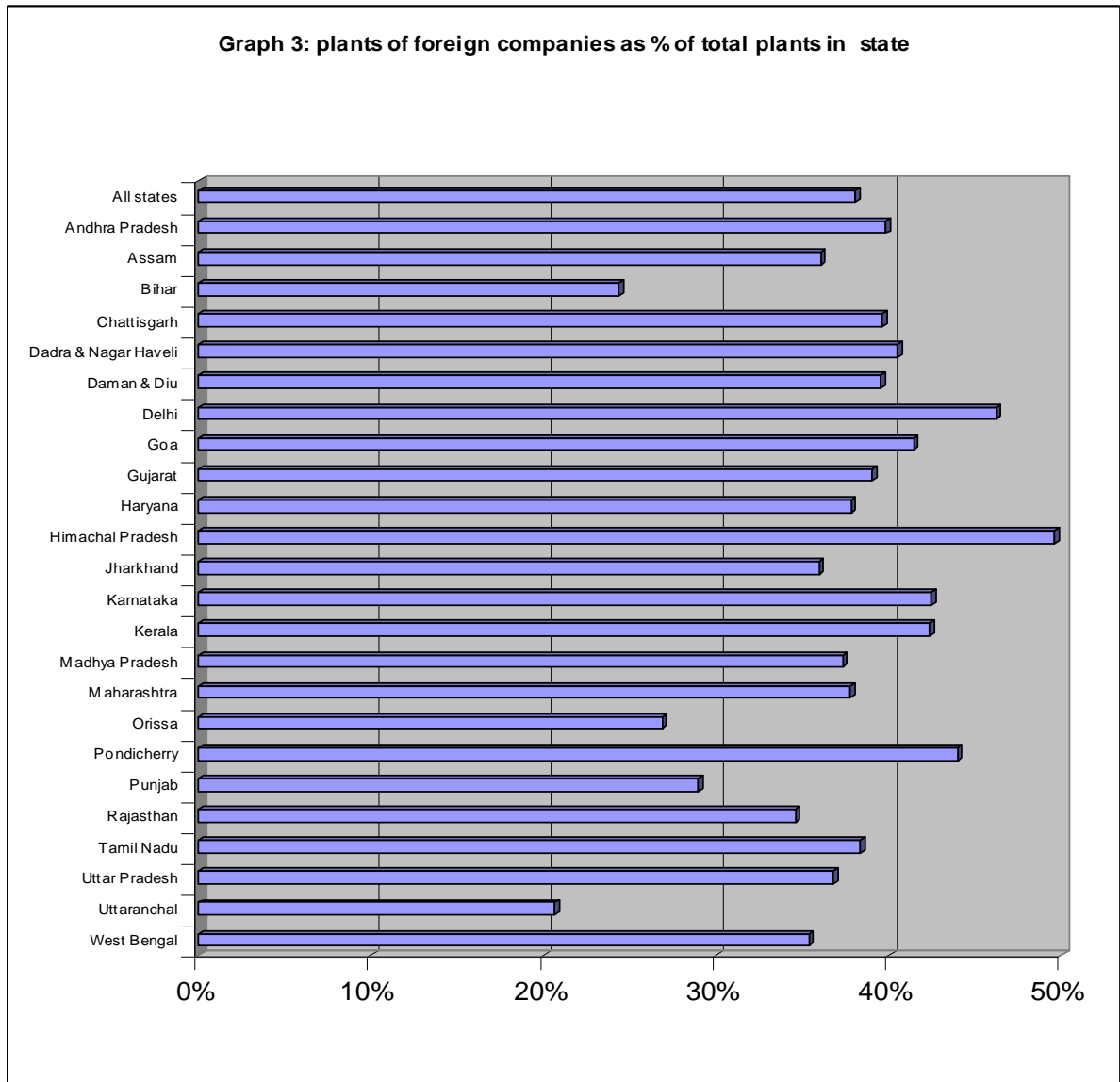
State	total plants	plants of foreign companies	plants of domestic companies	% distribution	
				plants of foreign companies	plants of domestic companies
Andhra Pradesh	671	267	404	9.0%	8.3%
Assam	122	44	78	1.5%	1.6%
Bihar	41	10	31	0.3%	0.6%
Chattisgarh	53	21	32	0.7%	0.7%
Dadra & Nagar Haveli	168	68	100	2.3%	2.1%
Daman & Diu	81	32	49	1.1%	1.0%
Delhi	106	49	57	1.6%	1.2%
Goa	111	46	65	1.5%	1.3%
Gujarat	1019	398	621	13.4%	12.8%
Haryana	328	124	204	4.2%	4.2%
Himachal Pradesh	115	57	58	1.9%	1.2%
Jharkhand	64	23	41	0.8%	0.8%
Karnataka	424	180	244	6.0%	5.0%
Kerala	144	61	83	2.0%	1.7%
Madhya Pradesh	292	109	183	3.7%	3.8%
Maharashtra	1545	583	962	19.6%	19.9%
Orissa	108	29	79	1.0%	1.6%
Pondicherry	91	40	51	1.3%	1.1%
Punjab	207	60	147	2.0%	3.0%
Rajasthan	321	111	210	3.7%	4.3%
Tamil Nadu	876	336	540	11.3%	11.1%
Uttar Pradesh	530	195	335	6.6%	6.9%
Uttaranchal	63	13	50	0.4%	1.0%
West Bengal	342	121	221	4.1%	4.6%
Total	7822	2977	4845	100.0%	100.0%

The distribution of foreign companies across states changes little if the equity cutoff for defining foreign companies is taken as 50% rather than 25%. This may be seen from Graph 2. In this case, again, the correlation coefficient is 0.99.



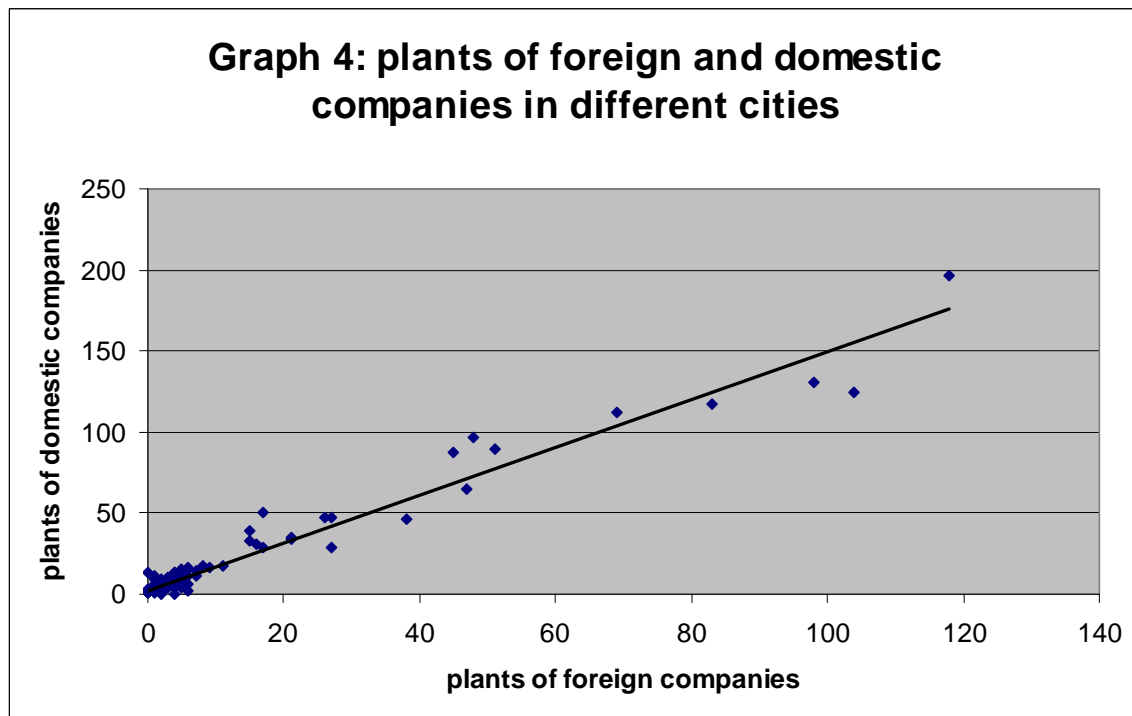
Graph 3 shows for different states the ratio of plants of foreign companies to the total number of plants (of companies). The proportion is about 40% at the aggregate level. The proportion is found to be relatively low for Bihar, Orissa, Pubjab and Uttaranchal. Morris has listed a number of cities which has been significant in attracting foreign investment

because of the dynamic character of the city and the best city serving function being performed (given above in Section 1). It may be noted that none of these cities belong to the four states for which the ratio of plants of foreign companies to total plants is found to be relatively low.



There is a great deal of similarity in the city-wise distribution of plants of domestic companies and foreign companies, as observed at the state level. This may be seen from Graph 4 which is based on data for top 100 most populated cities (in 17 states) in India. The correlation coefficient between the number of plants of domestic companies and that of foreign companies is 0.98.

Given the marked similarity in the regional distribution of the plants of domestic and foreign companies as evident from Table 1 and the Graphs 1, 2 and 4, it may be inferred that the factors influencing the location of plant of foreign companies are by and large the same as that of domestic companies. In other words, the determinants of regional distribution of FDI inflows seem to be the same as the determinants of domestic industrial investment in different regions.



4. Model explaining location of plants

An earlier study on location of industrial plants in India has been undertaken by Lal and Mengistae.³ The study focuses on 40 cities belonging to 12 states. To estimate their model, Lal and Mengistae have combined industry survey data from the World Bank’s Investment Climate Survey (ICS) of India along with establishment level data from the Annual Survey of Industries (ASI). They look into the agglomeration economies or clustering effects, as also the effects of business environment on location decision of plants. Business environment is disaggregated into (a) regulatory quality, (b) infrastructure quality; and (c) access to inputs such as finance and labor. Based on their study, Lal and Mengistae conclude that predatory enforcement of business regulations and excessive labor regulations have adverse effects on location decisions, while availability of infrastructure and access to finance and land have positive impacts.

³ Somik V. Lall and Taye Mengistae, “Business environment, clustering, and industry location: evidence from Indian cities” World Bank Policy Research Working Paper 3675, August 2005

However, agglomeration economies from own industry clustering also positively influence firm location decisions. This means that new firms will choose to locate production in areas that are already established centers in their line of business.⁴

Model specification

Specification of model for this study has been done keeping in mind the findings of studies of Aggarwal, Morris, and Lal and Mengistae mentioned above. Two factors that have been identified by these studies are: (a) business environment, and (b) the presence of metropolitan cities in the state, inasmuch as these provide advantage in 'headquartering' the country operations of MNCs. Variables representing these factors have naturally been included in the model specified for the present study. Other variables considered for the model are the educational attainment of workers and wage rate. These relate to factor cost and availability, and have been considered in the earlier studies. A fourth set of factors considered in this study relate to urban governance. Good urban governance is no doubt important for attracting plants of companies to a city, particularly foreign companies' plants. Since a measure of urban governance is not readily available, this has been proxied by the availability of civic amenities: tap water and closed drainage are taken as two indicators.

Thus, to explain the city-wise location of plants of foreign companies, the following model has been estimated using data for the top 100 most populated cities in 17 states (information on companies including information on plant location are for the year 2003-04 or 2004-05, or for an earlier year if data for 2003-04 and 2004-05 are not available).

⁴ There is another study on industrial location in India which requires a brief mention here. This is a study by Sanjay Chakravorty (Industrial Location in Post-Reform India: Patterns of Inter-regional Divergence and Intra-regional Convergence). The pattern of investment is studied at the district level. The study comes up with evidence both of inter-regional divergence and intra-regional convergence, and concludes that 'concentrated decentralisation' is the appropriate framework for understanding industrial location in post-reform India. To quote: "It is clear that both in determining which districts get some new investment and in determining the quantity of new investment, the most significant factors are the existence and size of investment from the pre-reform period and the existence and size of new investment in the neighbouring districts. The first factor implies continuity – evidence of a historical process of investment location. The second factor implies clustering – evidence of the role of geography in guiding investment location. Both factors are stronger in determining success/failure rather than quantity. One implication of this is that though historical processes are being continued in the choice of investment location, the volume of new investments is following a different pattern from the past. In other words, districts that were successful earlier continue to receive new investment, but degree of past success is not the best indicator of the degree of current success. The most successful pre-reform districts are not the most successful post-reform districts. There has been a shift in geographical focus whereby new investments seek locations within the existing leading regions (or clusters), but at new locations within these regions.

$$F_{ij} = a_0 + b_1 \ln(\text{POP}_{ij}) + b_2 \ln(\text{POP_BC}_j) + b_3 \text{IC}_j + \text{TAP}_{ij} + b_4 \text{C_DRAIN}_{ij} + b_5 \text{EDU}_j + b_6 \text{WAGE}_j + u$$

F_{ij} is the number of plants of foreign companies in city i of state j . POP_{ij} is population of city i of state j . POP_BC_j is the population of the biggest city in the state j . IC_j is the investment climate in state j . TAP_{ij} is the proportion of population having access to tap water in city i of state j . C_DRAIN_{ij} is the proportion of population having access to closed drains in city i of state j . EDU_j is the level of educational attainment of industrial workers of state j . WAGE_j is the wage rate received by organized sector industrial workers in state j .

Data on foreign companies' plant location [F_{ij}] have been taken from the Capitaline, as mentioned above. Data on the proportion of city population (for each of the 100 cities covered in the study) with access to piped water and closed drainage [TAP_{ij} and C_DRAIN_{ij}] have been taken from Census 2001. Data on population of the 100 select cities covered in the study [POP_{ij}] have been taken from this source, which has also been used to obtain for each state the population of the largest city [POP_BC_j]. Wage rate (for 2003-04) has been taken from the Annual Survey of Industries (ASI). Information on investment climate is based on a study of the Confederation of Indian Industry (CII) and the World Bank. Estimates of educational attainment of industrial workers have been made by Aggarwal⁵ using NSSO data for a Report prepared by the ICRIER for the World Bank.⁶ The estimates are reproduced in Table 2 along with the investment climate rating done by CII-World Bank.

⁵ Aggarwal, S.C. "Labour Quality in Indian Manufacturing: A State Level Analysis", Working Paper, Indian Council for Research on International Economic Relations, New Delhi, 2004; published in EPW.

⁶ C. Veeramani and Bishwanath Goldar, "Investment climate and total factor productivity in manufacturing: analysis of Indian states", Economic and Political Weekly, 2005.

Table 2: Percentage of Total Manufacturing Workers (under Regular/Salaried Category) with Secondary Education and Above

States	50th Round of NSSO (1993-94)	55th Round of NSSO (1999-00)
Best IC		
Maharashtra	34.79	41.16
Delhi	39.67	52.62
Good IC		
Gujarat	30.24	39.39
Andhra Pradesh	16.91	22.81
Karnataka	31.70	43.08
Punjab	32.22	28.12
Tamil Nadu	20.67	27.56
Haryana	34.23	37.26
Poor IC		
Madhya Pradesh	28.96	31.63
Kerala	18.16	20.24
West Bengal	18.50	23.48
Uttar Pradesh	20.31	23.35
Not Classified		
Assam	16.79	16.17
Bihar	25.26	25.29
Himachal Pradesh	21.05	34.16
Rajasthan	19.95	24.00
Orissa	33.06	20.54
All India	24.82	29.64

Source: Estimates taken from Aggarwal (2004).

To use investment climate as a variable in the regression, two dummy variables have been used, one for the best investment climate states and the other for the good investment climate states.

5. Empirical Results

The results of multiple regression analysis are presented in Table 3. Only some of the equations estimated are shown. The t-ratios are shown in parentheses.

Table 3: Determinants of location of plants of foreign companies, results of cross-city regression (dependent variable: number of plants of foreign companies in the city)

Explanatory variables	Regressions				
	(1)	(2)	(3)	(4)	(5)
Population of the city	15.5*** (7.4)	17.7*** (10.5)	15.8*** (7.7)	17.3*** (10.2)	15.3*** (7.8)
Population of the largest city in the state	2.86 (0.9)			5.0** (2.0)	7.2*** (3.1)
Best Investment climate (dummy)	13.3 (1.4)	14.4** (2.3)	18.3*** (2.6)		
Good Investment climate (dummy)	2.7 (0.6)	7.7** (2.1)	4.4 (1.0)		
Educational attainment of industrial workers	0.26 (0.8)	0.17 (0.7)	0.27 (0.9)	0.37* (1.74)	
Wage rate	-26.8 (-1.1)		-27.7 (-1.1)		-1.58 (-0.1)
Proportion of city population having access to tap water	0.007 (0.1)		0.019 (0.2)		
Proportion of city population having access to closed drains	0.14 (1.6)		0.13 (1.5)		0.18** (2.2)
Adjusted R ²	0.59	0.59	0.59	0.59	0.59
No. of observations	98	98	98	98	98

***, **, * statistically significant at one, five and ten percent level respectively.

The coefficient of city population is positive and statistically significant at one percent level, indicating a strong positive relationship between FDI and city size. The coefficient of population size of the largest city in the state is consistently positive and statistically significant in some of the equations. These results are in line with the hypothesis of Morris discussed earlier. The implication is that the presence of a metropolitan city in a state not only attracts FDI to the metropolitan city but also to other cities in the state.

The coefficient of the dummy variables representing investment climate is consistently positive and is statistically significant in some of the equations. It may be inferred that a good investment climate (in terms of labour regulations etc) attracts foreign investment. This is consistent with the findings of Aggarwal, and Lal and Mengistae.

The coefficient of the variable representing educational attainment of industrial workers is positive as expected. It is statistically significant in one of the equations presented in the table. The coefficient of wage rate is negative. However, in none of the equations estimated, the coefficient was found to be statistically significant. Thus, there are indications from the results that availability of educated industrial workers attracts foreign investment. But, no strong support is found for the hypothesis that low wages attract foreign investment.

Of the two civic amenities variables, tap water and closed drainage, the coefficient for former is positive but not found to be statistically significant. The coefficient for the later is consistently positive and is statistically significant in some of the equations estimated. It may be inferred accordingly that it is not only the city size but also the level of civic amenities being provide that influences the decision of foreign companies regarding plant location in the city.

6. Conclusion

Two important factors influencing regional spread of FDI are investment climate in different states and the cities services being provided including the level of civic amenities. The empirical evidence presented here indicate that the states would be able to attract more FDI by (1) improving investment climate through deregulation and betterment of infrastructure facilities, and (2) by making the cities in the state a better place to live in. The Jawaharlal Nehru Urban Renewal Mission is expected to bring about a major development in 63 major Indian cities. This would hopefully enable these cities to reach fully their economic potential. Particularly, this would help in attracting more foreign direct investment to the cities.